UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
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BIN C15700
Seattle, WA 98115-0070

NOAA Fisheries
No.: 2003/00688

October 3, 2003

David J. Kaumheimer
Environmental Program Manager
Bureau of Reclamation
1917 Marsh Road
Yakima, Washington 98901-2058

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Town Diversion Dam repair project in the Yakima River. (WRIA 39).

Dear Mr. Hoffman:

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended, 16 USC 1531, *et seq*. and the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, 16 U.S.C. 1855, the attached document transmits the NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and Essential Fish Habitat (EFH) consultation on the proposed Town Diversion Dam repair project in Kittitas County, Washington.

The U.S. Department of the Interior, Bureau of Reclamation (BOR) determined that the proposed action is likely to adversely affect the Middle Columbia River steelhead (*Oncorhynchus mykiss*) Evolutionarily Significant Unit (ESU). Formal consultation was initiated on July 10, 2003. The Opinion reflects the formal consultation and an analysis of effects covering the above listed species in the Columbia River above Wind River, Washington, upstream to, and including the Yakima River, Washington. The Opinion is based on information provided in the biological assessment addendum received by NOAA Fisheries on July10, 2003, and subsequent information transmitted by telephone conversations, fax, and electronic mail. A complete administrative record of this consultation is on file at the Washington State Habitat Branch Office.

NOAA Fisheries concludes that the implementation of the proposed project is not likely to jeopardize the continued existence of the Middle Columbia River steelhead ESU. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take resulting from the proposed action.

The BOR determined that EFH would be adversely affected by the proposed action. Through the MSA consultation NOAA Fisheries concluded that the proposed project may adversely impact designated EFH for chinook and coho (*O. kisutch*) salmon. Specific Reasonable and Prudent Measures of the ESA consultation, and Terms and Conditions identified therein, would address the negative effects resulting from the proposed action. Therefore, NOAA Fisheries recommends that they be adopted as EFH conservation measures.

If you have any questions, please contact Debbie Spring of the Washington State Habitat Branch Office at (509) 962-8911 or email at debbie.spring@noaa.gov.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Endangered Species Act Section 7 Consultation Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Ellensburg Town Diversion Dam Repair Project
Middle Columbia River Steelhead (*Oncorynchus mykiss)* Evolutionarily Significant Unit
Yakima River
Kittitas County, WA

Lead Action Agency: U.S. Bureau of Reclamation

Consultation Conducted by: National Marine Fisheries Service (NOAA Fisheries)
Northwest Region

Date Issued: October 3, 2003

Issued by: For Michael R Crouse

D. Robert Lohn
Regional Administrator

NMFS Tracking No.: 2003/00688

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1.0 INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the NOAA's National Marine Fisheries Service (NOAA Fisheries) and United States Fish and Wildlife Service (together "The Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the Essential Fish Habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The United States Department of the Interior, Bureau of Reclamation (BOR) is proposing to make repairs to the Town Diversion Dam, in Kittitas County, Washington. Elements of the project involve work in theYakima River, located within the geographic boundary and habitat of the Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*) Evolutionarily Significant Unit (ESU[1]), listed as threatened under the ESA. Additionally, the proposed action area is designated as EFH for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon. This document analyzes the effects of the repair activities related to the Town Diversion Dam project.

1.1 Background and Consultation History

On June 6, 2003, the BOR submitted a Biological Assessment (BA) for consultation on a Category 2 emergency modification of the Town Diversion Dam. On July 10, 2003, BOR submitted an addendum to the BA, in which only the fish ladder will be repaired while alternatives are evaluated, and formal consultation was initiated at that time. The BOR concluded that the actions described in the BA and the addendum are likely to adversely affect MCR steelhead. After analysis and review of the proposed action as presented, NOAA Fisheries concurred with this determination and initiated formal consultation. The formal consultation

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[11]"ESU" means a population or group of populations that is considered distinct (and hence a "species") for purposes of conservation under the ESA. To qualify as an ESU, a population must (1) be reproductively isolated from other conspecific populations, and (2) represent an important component in the evolutionary legacy of the biological species (Waples 1991).

process involved reviewing information contained in an original BA, the addendum, and correspondence and communication between the Washington Department of Fisheries and Wildlife (WDFW), BOR, and NOAA Fisheries (phone calls, meetings, and electronic mail (e-mail)). These documents and a record of communications are part of the administrative record for this consultation, and are on file at the Washington State Habitat Branch office.

On August 13, 2002, BOR personnel noticed exposed reinforcing steel on the lower section of the concrete apron and along the dam crest in the area of the fish ladder. On October 30, 2002, BOR thoroughly inspected the facility to determine the extent of the damage, and determined that the fish ladder was undermined to the point that it would likely collapse during the next spring run-off. In December 2002, they filled voids under the fish ladder with large rock as a temporary repair measure.

In the BA dated June 6, 2003, The BOR was proposing to: modify the left wing wall, which included extending the wing wall approximately 15 feet downstream; repair and modify the apron of the dam adjacent to the fish ladder; and fill the voids under the fish ladder with grout. While the repairs were being conducted, a temporary fish ladder would have had to been constructed to provide passage while the existing fish ladder was isolated.

The WDFW has proposed an alternative structure composed of a series of channel spanning rock weirs. They believe that such a structure would ensure better fish passage, allow more normative sediment transport, and better meet recreational and aesthetic considerations than a conventional diversion dam. The BOR has agreed to consider the WDFW proposal, but must implement interim measures to ensure the integrity of the dam and fish ladder during the year or so it will take to analyze a range of longer term solutions. On July 10, 2003, BOR notified NOAA Fisheries that they were setting aside their plans for major structural repairs to the dam and intended instead to implement a short-term repair pending a decision on a longer term action. The near-term repair is the subject of the present consultation.

1.2 Proposed Action

Proposed actions are defined in The Services' consultation regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." Additionally, U.S. Code (16 U.S.C. 1855(b)(2)) further defines a Federal action as "any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken by a Federal agency." Because BOR proposes to fund the action that may affect listed resources, it must consult under ESA section 7(a)(2) and MSA section 305(b)(2).

The BOR's new repair proposal would be to temporarily fill the voids under the ladder and the right abutment of the diversion dam with concrete.

The repair project would involve:

- Installing the upstream cofferdam - one day
- Installing the downstream cofferdam - five days
- Dewatering the ladder, constructing the settling ponds and concrete wash out pit - one day
- Moving rocks for diver support during inspection dive, and coring relief holes in the ladder slab - three days
- Pouring concrete - one day
- Removing downstream cofferdam - two days
- Removing upstream cofferdam - one day

The fish ladder will be closed at the upper end and the ladder will be dewatered as much as possible. While the cofferdam is being constructed, a fishery biologist on site will remove any and all fish from the cofferdam area. The first attempt would be to try and herd the fish out of the area before the cofferdam is closed off. Once the cofferdam is installed, fish will be captured using a seine, dip nets, and electro-shocker, and released into the Yakima River below the project area.

The action agency or its contractor will use a product called "Aqua Dam" which consists of two polyethylene liners contained by a single woven geo-tech outer tube. The aqua dam will coffer the work areas above and below the dam. Equipment will not enter the river to install the upper cofferdam. Once the upper cofferdam is in place and all appropriate fish removal methods have been undertaken, equipment may enter the river behind the cofferdam to secure it with sand bags or ecology blocks. Equipment will enter the river to create level a surface of clean gravel as a foundation for the downstream cofferdam. The BOR will attempt to stabilize this cofferdam by placing sand bags and ecology blocks with a shore-based crane, but it may be necessary for equipment to enter the river to achieve adequate stabilization. Once the cofferdam is properly seated and fish have been removed, a backhoe or tracked excavator will enter the river to remove the rock placed under the fish ladder in 2002.

After cofferdamming, divers will reconnoiter the base of the fish ladder to determine the extent to which it has been undermined. Once the extent of the voids is mapped and measured, the vicinity targeted for concrete pouring will be isolated with a plastic liner (within the area already coffered) so that the water that comes in contact with fresh concrete will not enter the Yakima River.

The BOR will use a concrete curing agent to minimize leaching, and protect water quality within the isolated area. This mixture has been successfully used by the Corps of Engineers on the Columbia River and has proven to help manage water quality issues related to concrete pours in and around the Columbia and Snake Rivers.

The concrete will be pumped into voids through a hose guided by a commercial diver. Before the concrete has started to be placed into the voids, water will be pumped from the confined area to plastic-lined settling ponds. Water will be pumped away from the area or the pour into the ponds until the concrete has cured. Water in the settling ponds will be buffered if, necessary before it is allowed to flow overland and discharge to the Yakima River.

Approximately 12 hours after placement of the concrete (or when the concrete has cured), the cofferdams will be removed and the fish ladder put back into operation.

To accommodate the construction activity, the fish ladder will be inoperable for an estimated 10 to 14 days. The project would start after September 29, 2003, after the BOR's operational "flip flop" occurs. The "flip flop" operational practice is described in section 2.1.3.2, below.

1.3 Description of the action area

An action area is defined by The Services' regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area affected by the proposed action starts at the project location along the Yakima River from 50 feet upstream to 300 feet downstream from project area at River Mile (RM) 161.3. For the purposes of this consultation, the action area includes all aquatic habitat and the adjacent riparian zone. This portion of the Yakima River supports MCR steelhead adult and juvenile migration, juvenile rearing and possibly spawning. It is also designated EFH for chinook and coho salmon.

2.0 ENDANGERED SPECIES ACT - BIOLOGICAL OPINION

The objective of this Opinion is to determine whether the Town Diversion Dam repair project is likely to jeopardize the continued existence of the MCR steelhead.

2.1 Evaluating the Effects of the Proposed Action

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA. In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and when appropriate combines them with The Habitat Approach (NMFS 1999): (1) consider the biological requirements and status of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species, and whether the action is consistent with any available recovery strategy; and (4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species. If jeopardy is found, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy.

The fourth step above (jeopardy) requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (*i.e.*, effects on essential features). The second part focuses on the species itself. It describes the action's effects on individual fish, populations, or both – and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to determine whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

2.1.1 Biological Requirements

The first step NOAA Fisheries uses when applying ESA section 7(a)(2) to the listed ESUs considered in this Opinion includes defining the species' biological requirements within the action area. Biological requirements are population characteristics necessary for the listed ESUs to survive and recover to naturally-reproducing population sizes at which protection under the ESA would become unnecessary. The listed species' biological requirements may be described as characteristics of the habitat, population or both (McElhany *et al.* 2000).

For actions that affect freshwater habitat, NOAA Fisheries may describe the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). Properly functioning condition is defined as the sustained presence of natural[2] habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999). Properly functioning condition then, constitutes the habitat component of a species' biological requirements. Although NOAA Fisheries is not required to use a particular procedure to describe biological requirements, it typically considers the status of habitat variables in a matrix of pathways and indicators (MPI) (NMFS Fisheries [1996] Table 1) that were developed to describe PFC in forested montane watersheds. In the PFC framework, baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning."

The biological requirements of MCR steelhead include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence *et al.* 1996). Even slight modifications of these habitat elements can produce deleterious effects to MCR steelhead. The biological requirements influenced by the proposed action include water quality and migratory access.

2.1.2 Status and Generalized Life History of Listed Species

In this step, NOAA Fisheries also considers the current status of the listed species within the action area, taking into account population size, trends, distribution, and genetic diversity. To

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[22] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon.

assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species and also considers any new data that are relevant to the species' status.

The BOR found that the proposed action is likely to adversely affect the threatened MCR steelhead. Based on the life histories of this ESU, the action agency determined that it is likely that juvenile, smolt, and adult life stages of these listed species would be adversely affected by the repair project.

MCR Steelhead

Most fish in this ESU smolt at two years and spend one to two years in salt water before reentering freshwater, where they may remain up to a year before spawning (Howell *et al.* 1985). All steelhead upstream of The Dalles Dam are summer-run (Schreck *et al.* 1986, Reisenbichler *et al.* 1992, Chapman *et al.* 1994). A nonanadromous form co-occurs with the anadromous form in this ESU; information suggests that the two forms may not be isolated reproductively, except where barriers are involved.

MCR steelhead, as well as other native fish stocks across the Columbia River Basin (CRB), have been negatively affected by a combination of habitat alteration and hatchery management practices. The four downstream, mainstem dams on the Columbia are perhaps the most significant source of habitat degradation for this ESU. The dams act as a partial barrier to passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. Profound alterations in the structure and function of riverine systems have provided conditions that impair the physiology of salmonids and invigorate native and nonnative predators, severely truncate or remove natural spatial and temporal discharge characteristics tied to life-history requirements, and often dictate the long-term timing of immigration and emigration. In addition to dams, irrigation systems have had a major negative effect by diverting large quantities of water, stranding fish, and acting as barriers to passage (WDF *et al.* 1993; Busby *et al.* 1996; NMFS 1996; March 10, 1998, 63 FR 11798,).

Habitat alterations and differential habitat availability (*e.g.*, daily or annually fluctuating discharge levels) impose an upper limit on the production of naturally spawning populations of salmon and steelhead. The National Research Council Committee (NRCC) on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996).

Hatchery management practices are suspected to be a major factor in the decline of this ESU. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation or introduction of deleterious (non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions

(Campton and Johnston 1985; Waples 1991; Hilborn 1992; NMFS 1996a; March 10, 1998, 63 FR 11798).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997). In many watersheds, land management and development activities have: (1) reduced connectivity (*i.e.*, the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior/delays; and (7) altered floodplain function, water tables and base flows (Henjum et al. 1994, McIntosh *et al.* 1994, Rhodes *et al.* 1994, Wissmar *et al.* 1994, National Research Council 1996, Spence *et al.* 1996, Lee *et al.* 1997, NMFS 1998; 1996, and Bishop and Morgan 1996).

MCR steelhead population sizes are substantially lower than historic levels, and at least two extinctions are known to have occurred in the ESU. In larger rivers (John Day, Deschutes, and Yakima), steelhead abundance has been severely reduced: it is estimated that the Yakima River had annual run sizes of 100,000 fish prior to the 1960's; however, only 505 adults returned to the basin in 1996 (WDF *et al.* 1993). Across the entire ESU, the wild fish escapement has averaged 39,000 and total escapement 142,000 (includes hatchery fish). The large proportion of hatchery fish, concurrent with the decline of wild fish, is a major risk to the MCR steelhead ESU (WDF *et al.* 1993; Busby *et al.* 1996; March 10, 1998, 63 FR 11798).

Pacific salmon populations also are substantially affected by variation in the freshwater and marine environments. Ocean conditions are a key factor in the productivity of Pacific salmon populations. Stochastic events in freshwater (flooding, drought, snowpack conditions, volcanic eruptions, etc.) can play an important role in a species' survival and recovery, but those effects tend to be localized compared to the effects associated with the ocean. The survival and recovery of these species depends on their ability to persist through periods of low natural survival due to ocean conditions, climatic conditions, and other conditions outside the action area. Freshwater survival is particularly important during these periods because enough smolts must be produced so that a sufficient number of adults can survive to complete their oceanic migration, return to spawn, and perpetuate the species. Therefore it is important to maintain or restore properly functioning conditions in order to sustain the ESU through these periods. Additional details about the importance of freshwater survival to Pacific salmon populations can be found in NMFS (2000).

Population Trends and Risks

Within the Yakima River Basin, wild adult steelhead returns have averaged 1,665 fish (range 505 (1996) to 4,491 (2002)) over brood years 1985-2002 as monitored at Prosser Dam (RM 47.1); YSS 2001, with Yakima-Klickitat Fisheries Program (YKFP) brood year 2001and 2002 data from www.ykfp.org. The comparatively large return of MCR steelhead to the Yakima Basin in 2002 mirrors high numbers of returning salmon and steelhead observed across to the Columbia basin in the past two years.

Generally, adult MCR steelhead migration into the Yakima Basin peaks in late-October and again from late February or early March, concurrent with the spawning run. Steelhead adults begin passing Prosser Dam in late summer, suspend movement during the colder parts of December and January, and resume migration from February through June. The relative number and timing of wild adult steelhead returning during the fall and winter-spring migration periods varies from year to year, most likely because of a low-flow induced thermal barrier in the lower Yakima River in the fall (BOR 2000; YSS 2001). Most adult steelhead over-winter in the Yakima River between Prosser and Sunnyside Dams (RM103.8) before moving upstream into tributary or mainstem spawning areas (Hockersmith *et al.* 1995).

Steelhead spawning varies across temporal and spatial scales in the Yakima Basin as well, although the present spatial distribution is significantly decreased from historic conditions. Hockersmith *et al.* (1995) identified the following spawning populations within the Yakima Basin: upper Yakima River above Ellensburg, Teanaway River, Swauk Creek, Taneum Creek, Roza Canyon, mainstem Yakima River between the Naches River and Roza Dam, Little Naches River, Bumping River, Naches River, Rattlesnake Creek, Toppenish Creek, Marion Drain, and Satus Creek. Typically, steelhead spawn earlier at lower, warmer elevations than higher, colder waters. Overall, most spawning is completed within the months of January through May (Hockersmith *et al.* 1995), although steelhead have been observed spawning in the Teanaway River (RM 176.1), a tributary to the Upper Yakima into July. These steelhead spawn later in the year at higher elevations in the Yakima basin, and face lethal conditions (in most years) as emigrating kelts (spawned-out adults returning to the ocean) in the lower Yakima River. The MCR steelhead that spawn in the Yakima basin at lower elevations potentially meet the same fate, however earlier spawn timing and emigration may provide increased survival because kelts traverse the lower Yakima River before water quality becomes lethal. High temperatures, low flows, and degraded water quality from irrigation effluents (*i.e.*, high temperature, turbidity and pollutant concentrations), contribute to extremely low survival during summer months (Vaccaro 1986; Lichatowich and Mobrand 1995; Lichatowich *et al.* 1995; Pearsons *et al.* 1996; Lilga 1998).

Four genetically distinct spawning populations of wild steelhead have been identified in the Yakima basin, one of which spawns in the upper Yakima River and its tributaries (Phelps *et al*. 2000). Hockersmith *et al.* (1995) found that 3% of radio-tagged steelhead from 1990 to 1992 utilized the upper mainstem Yakima River and its tributaries for spawning, beginning in early

March and extending into late May. Busack *et al.* (1991) analyzed scale samples from smolts and adult steelhead and found, generally, that smoltification occurs after two years in the Yakima system, with a few fish maturing after three years and an even smaller proportion reaching the smolt stage after one year. These data suggest that listed steelhead could be present in the action area virtually every day of the calendar year. Within the Yakima River basin, the Upper Yakima subpopulation of steelhead contributes to the run as a whole, both in terms of numbers and genetic diversity.

The upper Yakima steelhead population was undoubtedly adversely affected by operations at Roza Dam (RM 128) between 1941 and 1959. Although fitted with a ladder, the pool at Roza Dam was kept down from the end of one irrigation season (mid-October) to the beginning of the next (mid-March) for these 18 years. Hockersmith *et al.* (1995) found that steelhead passed Roza Dam from November through March, and more recent data suggest that passage occurs from the end of September through May (Mark Johnston, Yakama Nation Fisheries Program, personal communication). Consequently, operations at Roza Dam virtually eliminated fish passage for most of the steelhead migration season, and excluded most steelhead bound for the upper Yakima from reaching their destination. A new ladder was installed at Roza Dam in 1989 that allows better passage, but only when the pool is completely up or down. However, the ladder is inoperable at levels between maximum and minimum pool when the reservoir is manipulated to facilitate operational activities such as screen maintenance at the end of October and early November.

Steelhead across the Yakima River Basin have faced a number of challenges in the recent past, but continue to endure although at significantly depressed population levels. The four genetically dissimilar stocks identified persist across widely varied conditions of stream flow, habitat, topography, elevation, and land management scenarios, in a fraction of their historic habitat.

Threatened MCR steelhead are presently affected by a number of habitat modifications within the action area. The most prominent and deleterious modifications are the result of reservoir storage and irrigation activities, as well as development in the floodplain, riparian, and upland areas. Specifically, irrigation and development have had the following effects on the environmental baseline: (1) adversely affected instream flows; (2) degraded floodplain and streambank morphology and function; and (3) detached portions of the Yakima River and its tributaries from their historical floodplains creating impaired floodplain function.

For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[3] ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild

[33]Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between spawning aggregations. Population trends are projected under the assumption that all conditions will stay the same into the future.

origin (McClure *et al.* 2001). NOAA Fisheries has also estimated the risk of absolute extinction for four of the spawning aggregations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness equals zero), the risk of absolute extinction within 100 years for the Yakima River summer run is zero (McClure *et al.* 2001). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness equals 100%), the risk of absolute extinction within 100 years for the Yakima River is also zero (McClure *et al.* 2001). However, with respect to the Yakima River extinction risk, the estimates are extremely optimistic because of the nature of the source data and sparse information on hatchery fish.

2.1.3 Environmental Baseline in the Action Area

The environmental baseline is defined as: "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2, NOAA Fisheries' evaluates the relevance of the environmental baseline in the action area to the species' current status. In describing the environmental baseline, NOAA Fisheries evaluates the listed Pacific salmon ESUs affected by the proposed action.

The environmental baseline represents the present basal set of conditions to which the effects of the proposed action would be added. The term "environmental baseline" means "the past and present effects of all Federal, state, or private actions and other human activities in the action area, the anticipated effects of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the effect of state or private actions which are contemporaneous with the consultation in process " (50 CFR 402.02). As described above in section 1.4, the action area for this project extends from 50 feet upstream of the action area to 300 feet of the downstream-most construction element on the Yakima River.

The headwaters of the Yakima River (fifth order) emerge from the crest of the Cascade Mountains above Keechelus Lake. From there, the Yakima River flows approximately 215 miles downstream to Richland, Washington where it enters the Columbia River at RM 335.2. Total Yakima River drainage basin area is roughly 6,155 square miles, encompassing over 1,900 miles of perennial streams. No tributaries enter the Yakima River within the action area, however, major upstream systems include the Cle Elum and Teanaway Rivers in the upper basin. Below the action area, the largest natural tributaries entering the Yakima River are the Naches River and Ahtanum Creek (mid-part of the basin), as well as in the lower basin Toppenish and Satus Creeks.

The Yakima basin occupies two physiographic provinces (the Columbia Plateau and Cascade Mountains), and three major ecoregions (Cascades, Eastern Cascades Slopes and Foothills and

Columbia Basin (Omernik 1987)). Consequently, climate, topography, precipitation, and vegetative cover are highly variable. In addition, the distribution and type of aquatic and terrestrial habitat is quite variable, supporting a wide range of species. With respect to anadromous fishery resources, the Yakima Basin once supported abundant and diverse runs of salmon and steelhead that now return in just a fraction of their historic numbers (Nehlsen *et al.* 1991; Tuck 1995; Busby *et al.* 1996; NMFS 1996).

Water quality in the action area is generally good, primarily because of watershed position and relatively low levels of development in the area (HLA 2001). Land-use activities (roading, grazing, and forest practices) have deteriorated factors such as sediment cycling and nutrient delivery. With respect to water temperature, bottom-draw release structures like those used at Cle Elum, Keechelus and Kachess Dams provides thermally homogeneous, cold discharge to the Yakima River, and may interfere with certain aspects of salmonid ecology in the action area (*e.g.*, migration cues, spawn timing, and growth). However, the effect of this mechanism on salmonid ecology has not been empirically evaluated.

Floodplain development and revetments, agricultural diversion structures, floodplain roads, and armored streambanks throughout the Yakima River Basin and action area has altered natural processes that served to (1) promote exchange of water and sediments between the river and its overbank habitats, (2) provide lateral habitat heterogeneity for MCR steelhead, and (3) maintain riparian habitat communities dependent on natural streamflow dynamics. As described in the preceding paragraph, flow management scenarios have served to exacerbate floodplain function problems.

Throughout the action area, riparian habitat has been degraded through a variety of activities. Among them, roading (both parallel to and across the river), farming, diking, grazing, urban development, and flood control have had the greatest effect. These activities have degraded riparian habitat by direct canopy removal, covering the ground with materials that preclude plant growth, reducing the widths of riparian zones, and altering the riparian species composition in favor of nonnative plants. For MCR steelhead, the lack of properly functioning riparian habitat contributes to instream temperatures that may seasonally exceed physiological tolerances and streambank erosion that increases sedimentation of spawning habitat. In addition, degraded riparian zones contribute an inadequate amount of Large Woody Debris (LWD), and subsequently prevent or inhibit habitat forming processes such as pool formation and establishment of instream cover. Although the Yakima River in the action area exhibit some intact floodplain riparian habitats, flow management practices provide discharge out of phase with the natural hydrograph that is temporally incompatible with salmonid life stage, riparian, and hyporheic species' requirements.

2.1.3.1 Habitat and Hydrology

Substantial habitat blockages are present in this ESU. In the Yakima basin, Cle Elum, Rimrock, and Bumping Dams are examples of storage projects that have blocked many miles of formerly utilized habitats since the early part of the Twentieth century. Water withdrawals and overgrazing have seriously reduced summer flows in the principal summer steelhead spawning and rearing tributaries. This is significant because high summer and low winter water temperatures are limiting factors for salmonids in many streams in this region (Bottom *et al.* 1985).

Reservoir operations in the Upper Yakima Basin and action area have inverted and truncated the natural hydrograph, produced river systems that are out of phase with their natural hydrographs, and the biota of these systems have suffered accordingly. The biota of these systems have suffered accordingly because flow regulation patterns are, at best, suboptimal for adult and juvenile steelhead (Fast *et al.* 1991; Stanford *et al.* 2002). In the MPI analysis, instream flows fall under the Flow/Hydrology pathway, and Change in Peak/Base flow indicator. Presently, for the reasons described above, this indicator is *not properly functioning*. In this instance, *not properly functioning* is defined as "pronounced changes in peak flow, base flow and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography." Additionally, alteration of the natural hydrograph has altered sediment transport relationships important to channel morphology and salmonid ecology.

2.1.3.2 Instream Flows

Instream flows in theYakima Rivers within the action area are mostly derived by natural watershed processes (snowmelt runoff and rain-on-snow events), but more significantly by the operation of BOR storage reservoirs (*e.g.*, Keechelus, Kachess, Cle Elum, and Easton). In an unregulated condition, the Yakima River would exhibit the hydrographs of snowmelt-dominated systems where discharge peaked in May concurrent with melting snow, and reached baseflow in late July. Discharge would have increased in early winter, as precipitation in the form of rainfall (and early snowmelt, to some degree) augmented summer baseflow (Kinnison and Sceva 1963). Under these conditions, river ecosystems experienced a range of flows that served to promote floodplain riparian ecosystems, provide habitat for aquatic species assemblages, and protect vital ecosystem linkages and channel structure (Leopold *et al.* 1964; Ward and Stanford 1995a; 1995b; Fisher *et al.* 1998). Accordingly, aquatic biota have, over the eons, evolved life-history strategies that are spatially and temporally synchronized to seasonal runoff patterns (Groot *et al.* 1995; Stanford *et al.* 1996).

Presently, the Yakima River is manipulated to maximize winter reservoir storage and summer irrigation deliveries that are synchronized with the seasonal needs of irrigators. However, in most cases, reservoir operations produce streamflows across the basin that are asynchronous with the life-history requirements of aquatic species assemblages. Large volumes of water are released into the Yakima River throughout the summer months (irrigation season), peaking in mid to late August. Streamflows well in excess of estimated unregulated discharge persists throughout the action area until the end of the irrigation season, usually around mid-October. In early September, through a process known as "flip-flop," releases from reservoirs (primarily Keechelus, Kachess, Cle Elum and Easton) in the "Yakima Arm" (the Yakima River above the Naches River confluence) of the system are ramped down to a fraction of their August discharge levels in an attempt to minimize the dewatering of spring chinook redds during winter storage operations (downstream to Roza Dam). Downstream irrigation deliveries are then primarily met from Rimrock and Bumping Reservoirs in the "Naches Arm" (the Naches River and its tributaries) of the system, which equates to abnormally high discharge levels in the Tieton and Naches Rivers thorough the middle of October – the traditional end of the irrigation season.

The flip-flop operation involves a radical flow manipulation in reaches of the Upper Yakima River below Keechelus, Kachess, and Easton Dams. For example, in the Yakima River, discharge levels can range from approximately 3,000 cubic feet per second (cfs) in late August to less than 250 cfs by the second week of September. After spring chinook finish spawning, incubation (*i.e.*, winter) flows are further reduced from those flows released in September. Minimal discharge is released from BOR reservoirs during the winter in an effort to maximize reservoir storage. Generally, inflow exceeds outflow throughout the winter until reservoir storage reaches elevations where releases are made per flood rule curves. The BOR reservoirs are operated to maximize storage levels by late May, just before deliveries for irrigated agriculture begin, usually in late June or early July.

Instream flow related to delivery of irrigation demands, have greatly affected biotic and abiotic conditions in the Yakima River in the action area. Generally, instream flow problems stem from chronically low discharge levels during reservoir refill periods to inordinately high flows out of phase with the ecology of steelhead when downstream demands are being met. Steelhead spawning flows in the Yakima River can be depressed by low discharge levels if low snowpack and runoff extend reservoir refill periods. Incubation, fry, and juvenile rearing conditions can be problematic as high discharge levels produce high velocity habitats that can displace individuals downstream. In addition, high discharge levels during the summer months can produce rearing conditions that are energetically stressful to juvenile fish, stunting their growth and maturity to smoltification. Spring chinook salmon spawn in theYakima River during high irrigation delivery flows (August to Mid-September) that are cut by more than 90% for incubation discharge levels (mid-October through early spring). These incubation flows also dewater side-channel habitats that are important to the juvenile life-stage of all salmonids.

2.1.3.3 Riparian Habitat

Forest practices, agriculture, urbanization, and flood control have adversely affected riparian habitat in the Upper Yakima Basin. In the action area of this project, the river channel is confined between levees that support little riparian vegetation. Consequently, the potential for normal riparian processes (*e.g*., shading, bank stabilization and LWD recruitment) to occur is diminished, and aquatic habitat has become simplified (Ralph *et al.* 1994; Young *et al.* 1994; Fausch *et al.* 1994; Dykaar and Wigington 2000).

In the MPI analysis, the alteration of riparian vegetation affects several pathways and indicators. For the Yakima River reach of the action area, the Watershed Conditions pathway and Riparian Reserves indicator *is not properly functioning*: the riparian reserve system is fragmented, poorly connected, and provides inadequate protection of habitats and refugia for sensitive aquatic species (less than 70% intact). In addition, the Temperature and LWD indicators, from the Water Quality and Habitat Elements pathways, are *not properly functioning* (Yakima River) because of impaired riparian function.

2.1.3.4 Channel Condition and Dynamics

Alluvial channel patterns adjust by lateral planform migration and longitudinal profile changes through aggradation and degradation (Leopold *et al.* 1964; Dunne and Leopold 1978; Alabyan and Chalov 1998). As such, the river has a natural tendency to respond to flood events by occupying distributary channels, dissipating excessive erosive energy, rebuilding floodplain habitats, and recharging the shallow alluvial aquifer. Within the action area, levees severely limit floodplain/channel interaction. This condition results in higher water velocity during moderate and large flood events, which in turn threatens the integrity of the Town Diversion Dam.

The levees have greatly inhibited the exchange of hyporheic waters, isolated and truncated hyporheic habitats, and greatly simplified salmonid and macroinvertebrate habitats. In addition, floodplain anthropogenic activities, in combination with surface-water management scenarios, have served to alter the natural exchange of waters between the shallow alluvial aquifer of glacial deposits and the Yakima River within the action area. As a result, the Floodplain Connectivity and Width/Depth Ratio indicators (Channel Condition and Dynamics pathway) are *not properly functioning*. In this instance, *not properly functioning* is defined as "severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly." In addition, the Off-channel Habitat indicator (Watershed Condition pathway) is *not properly functioning*, because "few or no backwaters, off-channel ponds, or low energy off-channel areas" presently exist.

2.2 Analysis of Effects

Effects of the action are defined as: "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species' biological requirements or impairing the essential features of critical habitat. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or critical habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In step 3 of the jeopardy analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery.

2.2.1 Habitat Effects

For the streams typically considered in salmon habitat-related consultations, a watershed is a logical unit for analysis of potential effects of an action (particularly for actions that are large in scope or scale). Healthy salmonid populations use habitats throughout watersheds (Naiman *et al.* 1992), and riverine conditions reflect biological, geological and hydrological processes operating at the watershed level (Nehlsen 1997; Bisson *et al.* 1997; and NMFS 1999). Although NOAA Fisheries prefers watershed-scale consultations due to greater efficiency in reviewing multiple actions, increased analytic ability, and the potential for more flexibility in management practices, often it must analyze effects at geographic areas smaller than a watershed or basin due to a proposed action's scope or geographic scale. Analyses that are focused at the scale of the site or stream reach may not be able to discern whether the effects of the proposed action will contribute to or be compounded by the aggregate of watershed impacts. This loss of analytic ability typically should be offset by more risk averse proposed actions and ESA analysis in order to achieve parity of risk with the watershed approach (NMFS 1999).

2.2.1.1 Turbidity

Instream installation/removal of the cofferdams used to isolate the action area and removal of riprap from the scour area, within theYakima River will mobilize sediments and temporarily increase downstream turbidity levels. In the immediate vicinity of the construction activities (several hundred feet), the level of turbidity will likely exceed the natural background levels and potentially affect listed MCR steelhead.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (*i.e.*, gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985; Servizi and Martens 1992).

When the particles causing turbidity settle out of the water column, they contribute to sediment on the riverbed (sedimentation). When sedimentation occurs, salmonids may be negatively affected: (1) buried salmonid eggs may be smothered and suffocated, (2) prey habitat may be displaced, and (3) future spawning habitat may be displaced (Spence *et al.* 1996). In addition, turbidity and subsequent sedimentation can affect the quality of stream substratum as spawning material, influence the exchange of streamflow and shallow alluvial groundwater, occupy channel storage areas for cobbles and gravels, increase width-depth ratios, depress riverine productivity, and contribute to decreased salmonid growth rates (Waters 1995; Newcombe and Jensen 1996; Shaw and Richardson 2001). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

The proposed action is likely to create pulses of increased turbidity only during the placement and removal of the cofferdams. However, the effects of this turbidity on listed fish will be minimized by: 1) conducting most in-water work within the perimeter of the cofferdams, (2) performing in-water construction activities during low-flow periods (October through December in 2003) when sediment would be expected to quickly settle out of the water column, and 3) timing operations to avoid steelhead spawning and incubation periods.

Furthermore, construction methods will ensure that turbidity levels generated by the action do not exceed 5 nephelometric turbidity units (NTU) above background levels beyond 300 feet downstream of the project area. Finally, it is expected that listed fish present during the initial phases of construction will temporarily move to refuges where turbidity can be avoided, thus preventing injury or death.

It is expected that turbidity and sedimentation caused by this action will be short lived, returning to baseline levels soon after construction is over. Other than the short-term inputs mentioned above, this project will not change or add to the existing baseline turbidity or sedimentation levels within the action area.

2.2.1.2 Streambed and Bank Disturbance

The proposed action will result in the disturbance of a few thousand square feet of the riverbed and a much lesser amount of the riverbank. The effects of this disturbance to MCR steelhead are expected to be minor, however. As previously noted, the riverbank within the action area is a levee, composed of large rock, and supports little vegetation. Accordingly, the effect of disturbing the bank to provide equipment entry into the river is expected to be insignificant. Similarly, the disturbance of the stream bed is not expected to result in more than insignificant effects to physical habitat conditions. The result of the disturbance will likely be a temporary re-contouring of native substrates that will be undone by the next high flow event. The most significant effect of streambed disturbance would be the temporary loss (burial or displacement) of some potential salmonid food items (invertebrates).

Invertebrates (*e.g.*, larval insects, obligate aquatic insects, molluscs, crustaceans etc.) recolonize disturbed areas by drifting, crawling, swimming, or flying in from adjacent areas (Mackay 1992). The time required for new invertebrates to reach pre-disturbance abundance levels and equilibrium would be related to the spatial scale of their initial habitat loss, the persistence of the excluding or disturbing mechanism, the size of adjacent or remnant invertebrate populations (potential colonizers), the season in which the disturbance is taking place, and the life history characteristics of the invertebrate species (Mackay 1992).

The effects of the loss food items will likely be minor and short-lived, as invertebrates will rapidly recolonize the disturbed substrate (Allan 1995). Long-term effects to prey abundance and habitat are not anticipated because: (1) the footprint of the disturbance is relatively small, (2) the fall work window coincides with high levels of invertebrate activity (and therefore recolonization potential), and (3) following construction, new riverbed materials will resemble pre-disturbance habitat (*i.e.*, benthic habitat will not be permanently displaced). The repair activities should not reduce the long-term functional quality of juvenile foraging habitat in the action area.

2.2.1.3 Removal of Fish and Isolation from the River by Cofferdams

Fish will be removed from the project area according to the guidance in NMFS 2000. Before, and during the placement of the aquadam, a fishery scientist will try to herd the fish away from the project area. Once the cofferdam is in place, and before any equipment enters the isolated area, if listed fish are stranded, they will be first removed by the use of dip nets, and then electrofishing, and released upstream at an appropriate habitat near the project area. If electrofishing is employed, the contractor will follow the *Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act* (NMFS 2000). These guidelines reduce the adverse impacts of electrofishing on fish and increase electrofishing efficiency.

The isolation and subsequent removal of water from the project area from the Yakima River might result in the stranding of juvenile salmonids. Additionally, the temporary closure of the fish ladder will impede salmonid migration. The effects of dewatering will be reduced by removing the fish to an upstream location through passive and active removal techniques as well as gradual dewatering, enabling qualified staff to remove any additional stranded fish.

Diverting water will also cause temporary loss (burial, dessication, and displacement) of macro-invertebrate habitat. Effects associated with the disruption of the streambed likely would be short-lived, and recolonization rates are expected to be rapid due to the small size of disturbance and relatively short time period of construction activities.

2.2.2 Indirect Effects

Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 CFR 402.02). Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include the effects of other Federal actions that have not undergone section 7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action. The indirect effects resulting from the proposed Town Diversion Dam Repair project includes deposition of sediment upstream and downstream from the fish ladder, and formation of a scour pool downstream of the toe.

2.2.3 Species Effects

While population growth rates have been calculated at the large ESU scale, changes to the environmental baseline from the proposed action were described only within the action area (typically a watershed). An action that improves habitat in a watershed, and thus helps meet essential habitat feature requirements, may therefore increase lambda for the Upper Yakima Steelhead population of the ESU in the action area.

Based on the effects described above, the proposed action will have a neutral effect on the reproduction, numbers, and distribution of the affected MCR steelhead population.

2.2.4 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." These activities within the action area also have the potential to adversely affect the listed species and critical habitat. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations have been added to the description of the environmental baseline in the action area.

State, tribal, and local government actions will likely be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses – Including ownership and intensity – any of which could adversely affect listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties.

Changes in the economy have occurred in the last 15 years, and are likely to continue, with less large-scale resource extraction, more targeted extraction, and significant growth in other economic sectors. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water supplies, waste-disposal sites, and other infrastructure.

Economic diversification has contributed to population growth and movement, and this trend is likely to continue. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated.

Agricultural activities are the main land use in the action area. Riparian buffers are not properly functioning, containing little woody vegetation. Although land use practices that would result in take of endangered species is prohibited by section 9 of the ESA, such actions do occur. NOAA Fisheries cannot conclude with certainty that any particular riparian habitat will be modified to such an extent that take will occur. Riparian habitat is essential to salmonids in providing and maintaining various stream characteristics such as; channel stabilization and morphology, leaf litter, and shade. However given the patterns of riparian development in the action area and rapid human growth of Kittitas County, it is reasonably certain that some riparian habitat will be impacted in the future by non-Federal activities.

The state of Washington has various strategies and programs designed to improve the habitat of listed species and assist in recovery planning. Washington's 1998 Salmon Recovery Planning Act provided the framework for developing watershed restoration projects and established a funding mechanism for local habitat restoration projects. The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. The WDFW and tribal co-managers have been implementing the Wild Stock Recovery Initiative since 1992. The co-managers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The state of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has developed a schedule that is updated yearly; the schedule outlines the priority and timing of TMDL plan development. Washington State closed the mainstem Columbia River to new water rights appropriations in 1995, but lifted this moratorium in 2002. The state has proposed to mitigate the effects of new appropriation by purchasing or leasing replacement water when Columbia River flow targets are not met. The efficacy of this program is unknown at the present time.

It is expected that a range of non-Federal activities would occur within the Yakima River Basin for the purposes of restoring and enhancing fish habitat. These activities would likely include installing fish screens, improving flow management and irrigation efficiency, restoring instream and riparian habitat, and removing barriers to passage. Although the specific details of individual projects are lacking, it is assumed that non-Federal conservation efforts would continue or increase in the near future.

In addition to potential beneficial projects, it is also likely that much of the private land management and water regulation will continue under existing conditions. Specific activities such as farming in or adjacent to sensitive riparian areas, and tributary diversions that (1) remove large volumes of water and (2) block access to quality habitats will continue to adversely affect listed MCR steelhead.

2.3 Conclusion

NOAA Fisheries has reviewed the direct, indirect, and cumulative effects of the proposed action on MCR steelhead and their habitat. NOAA Fisheries evaluated these effects in light of the existing conditions in the action area and the measures included in the action to minimize the effects. The proposed action is likely to cause short-term adverse effects on the listed salmonid, by construction activities and minimal habitat modification. The proposed action will cause no effects that when added to the environmental baseline would influence existing population dynamics. Therefore, the proposed action will not jeopardize MCR steelhead.

2.4 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. The conservation recommendations listed below are consistent with these obligations, and therefore should be implemented by the BOR.

NOAA Fisheries recommends that the BOR thoroughly evaluate all options that would ensure better fish passage, allow a more normative sediment transport, and better meet safety, recreational, and aesthetic considerations as an alternative to maintaining a conventional diversion dam at this location.

To encourage greater habitat diversity near the project area, NOAA Fisheries recommends increasing riparian planting in the upstream and downstream vicinity of the project, and placing LWD along the riverbanks. Placing LWD may encourage higher densities of juvenile MCR steelhead (Peters *et al.* 1998). Presently, the reaches of the Yakima river in the action area lack the habitat heterogeneity essential for reaching PFC.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or critical habitat, NOAA Fisheries requests notification of the achievement of any conservation recommendations when the action agency submits its monitoring report describing action under this Opinion or when the project is completed.

2.5 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: 1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; 2) new information reveals effects of the action may affect listed species in a way not previously considered; 3) the action is modified in a way that causes an effect on listed species that was not previously considered; or 4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation.

2.6 Incidental Take Statement

Section 9 and rules promulgated under subsection 4(d) of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is defined as an act that may include significant habitat modification or degradation where it actually kills or injures fish by impairing breeding, spawning, rearing, migrating, feeding, or sheltering." Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.6.1 Amount or Extent of Take

As stated in section 2.1.3, above, MCR steelhead use the upper Yakima River for both spawning and rearing. Based on information reported in Phelps *et al.* (2000), Hockersmith *et al.* (1995), and Busack *et al.* (1991), MCR steelhead are likely to be present in the action area every day of the year. Therefore, incidental take of MCR steelhead is reasonably certain to occur. The exact numerical amount of take in this instance is difficult if not impossible to quantify. In such cases where NOAA Fisheries finds the amount of take to be unquantifiable, the extent of effects to habitat in the action area are analyzed as a surrogate for the amount of anticipated take.

Take is reasonably certain to occur in the form of "harm," or habitat modification to an extent that impairs essential behaviors including feeding and sheltering. The mechanisms of harm from the proposed action include the loss of food items from streambed disturbance, sediment mobilization during the installation and removal of cofferdams, injury or death from capturing and handling, and mechanical injury or death associated with work within the cofferdams to fish that evade capture.

Because fish presence at any given locale can vary widely over time, NOAA Fisheries cannot estimate a specific of take of individual MCR steelhead in the present instance, despite the use of the best scientific and commercial data available. As a surrogate for estimating the number of fish harmed by the proposed action, NOAA Fisheries has estimated the extent of habitat affected by those activities and has assumed that fish capture and removal techniques will be highly effective.

For water quality effects, take is anticipated from turbidity increases within not more than 300 feet downstream of the lowermost cofferdam. For streambed disturbance, the extent of anticipated take is that associated with the operation of heavy equipment and cofferdam construction over not more than 6,000 square feet of the streambed. For fish capture and removal, the extent of anticipated take is that which would result from properly capturing and relocating the number of fish that would be inadvertently trapped within the 6,000 square foot area covered by and contained within the cofferdams. For injury or mortality to fish that could not be removed from behind the cofferdams, the amount of take anticipated is the number of fish that remain after the BOR has implemented all reasonable means of fish capture and removal.

Should any of these described limits be exceeded, BOR must reinitiate consultation.

2.6.2 Reasonable and Prudent Measures

Reasonable and Prudent Measures are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. The BOR has the continuing duty to regulate the activities covered in this incidental take statement. If BOR fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require further consultation.

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of listed fish resulting from implementation of the action. These reasonable and prudent measures would also minimize adverse effects on designated critical habitat.

The BOR shall:

1. Minimize incidental take from staging and onshore construction activities.

2. Minimize incidental take from instream construction activities.

3. Minimize incidental take from fish capture and removal.

2.6.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement Reasonable and Prudent Measure No. 1 (staging and onshore construction activities) by conducting the following:

a. The contractor will develop an adequate, site-specific Spill Prevention and Countermeasure or Pollution Control Plan (PCP), and is responsible for containment and removal of any toxicants released. The contractor will be monitored by the BOR to ensure compliance with this PCP. The PCP shall include the following:

    i. A site plan and narrative describing the methods of erosion/sediment control to be used to prevent erosion and sediment for contractor's operations related to disposal sites, borrow pit operations, haul roads, equipment storage sites, fueling operations, and staging areas.
    ii. Methods for confining and removing and disposing of excess construction materials, and measures for equipment washout facilities.
    iii. A spill containment and control plan that includes: Notification procedures; specific containment and clean up measures which will be available on site; proposed methods for disposal of spilled materials; and employee training for spill containment.
    iv. Measures to be used to reduce and recycle hazardous and non-hazardous waste generated from the project, including the following: types of materials, estimated quantity, storage methods, and disposal methods.
    v. The identity of the Erosion and Pollutant Control Manager, who shall also be designated as responsible for the management of the contractor's PCP.

b. A temporary erosion and sediment control (TESC) plan will be implemented.
c. All heavy equipment will be clean and free of external oil, fuel, or other potential pollutants.
d. Areas for fuel storage, refueling, and servicing of construction equipment and vehicles will be at least 150 feet from the stream channel, and all machinery fueling and maintenance will occur within a contained area. Overnight storage of vehicles and equipment must also occur in designated staging areas.

2. To implement Reasonable and Prudent Measure No. 2 (instream construction activities) by conducting the following:

    a. Begin instream work no later than October 1 and end instream work no later than December 31.
    b. Ensure that the fish ladder is inoperable for not more than 14 days.
    c. Before operations begin and as often as necessary during operation, all equipment that will be used below bankfull elevation will be steam cleaned until all visible external oil, grease, mud and other visible contaminants are removed.
    d. During construction of the cofferdam, heavy equipment will work from on-shore staging areas, with the exception of the actual excavator arm and bucket.
    e. Each cofferdam will be adequately constructed to totally the work area from adjacent river channels.
    f. Any fill material entering the Yakima River will be clean, free of fines, and will consist of native rock.

g. Measures will be taken to prevent construction debris from falling into any aquatic habitat. Any material that falls into a stream during construction operations will be removed in a manner that has a minimum impact on the streambed and water quality.
h. Pumps will be run before and during the placement of the cement to ensure no potentially contaminated water comes in contact with the Yakima River.

3. To implement Reasonable and Prudent Measure No. 3 (fish removal) by conducting the following:

a. Prior to cofferdam closure, fish will be removed from the area by a qualified fishery scientist experienced in such efforts and all staff working with the seining operation must have the necessary knowledge, skills, and abilities.
b. Listed fish must be handled with extreme care, and kept in water to the maximum extent possible during capture and transfer procedures. The transfer of ESA-listed fish must be conducted using a sanctuary net that holds water during transfer, whenever necessary to prevent the added stress of an out-of-water transfer.
c. To ensure the safe handling of all ESA-listed fish, in this specific order:

i. herding them out before cofferdam closure;
ii. beach seining;
iii. dipnets;
iv. electrofisher; fish may be captured using electrofishing gear as described in NOAA Fisheries guidelines (NMFS 2000).

d. Captured fish must be released in appropriate habitat, as near as possible to, but downstream of the capture site.
e. ESA listed fish will not be marked or anaesthetized.
f. In the event that listed steelhead are killed or injured during the herding and netting process, the qualified fishery scientist will immediately contact NOAA Fisheries.

All terms and conditions shall be included in any permit, grant, or contract issued for the implementation of the action described in this Opinion.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Statutory Requirements

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan.

Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).
- NOAA Fisheries must provide conservation recommendations for any Federal or state action that may adversely affect EFH (section 305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Essential Fish Habitat consultation with NOAA Fisheries is required for any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*)(PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action areas are detailed above in sections 1.2 and 1.3 of this Opinion. The action area contains habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Actions

As described in detail in section 2.2 of this Opinion, the proposed activities may result in detrimental short- and long-term effects to a variety of habitat parameters.

1. The proposed action will result in the short-term degradation of water quality (turbidity) and the potential for contaminants to reach the stream, because of instream and nearstream construction activities.
2. The proposed action will result in the short-term degradation of benthic foraging habitat because of instream rock placement.

3.5 Conclusion

NOAA Fisheries believes that the proposed action may adversely affect designated EFH for chinook and coho salmon.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that may adversely affect EFH. NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the action agency, and believes that these measures are sufficient to minimize, to the maximum extent practicable, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. Consequently, NOAA Fisheries recommends that the

BOR implement the following actions to minimize the potential adverse effects to EFH for chinook and coho salmon:

1. To minimize EFH adverse effect No. 1 (water quality), the BOR should ensure that:

    a. The contractor has a Spill Prevention Control and Containment Plan (SPCC) and TESC Plan in place prior to the start of any construction activities.

    b. Turbidity plumes do not extend greater than 200 feet downstream of the project area (for flows above 10 cfs and less than 100 cfs). If flows exceed 100 cfs, turbidity should not extend beyond 300 feet downstream of the project area.

2. To minimize EFH adverse effect No. 2 (degradation of benthic foraging habitat), all work within the active channel should be completed within the BOR approved work window, and completed with the shortest duration possible.

3.7 Statutory Response Requirement

Since NOAA Fisheries is not providing conservation recommendations at this time, no 30-day response from the BOR is required (MSA section 305(b)(4)(B)).

3.8 Supplemental Consultation

The BOR must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

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